

# Multiple Alleles

- **Multiple alleles** are when there are more than two different alleles for one trait.
  - **Example:** Fruit flies can have several different eye colors, such as red, apricot, honey, and white. The dominant hierarchy is as follows: red dominant to apricot, is dominant to honey, is dominant to white.
- Capital letters and subscript numbers are used to express the different genes and their combinations.

- Fruit flies can have 4 different eye colours
- Wild type (red)
- Apricot colour
- Honey colour
- White colour



- Eye colour is controlled by 4 different genes
  - Which one wins?
  - The order is this:
- red > apricot colour > honey colour > white
- Geneticist determine this order by seeing which colour shows up the most (red) in fly populations, followed by the next most abundant (apricot) and so on.

$C^{ch}$

Phenotype	Genotype	Dominant To
1 Red	$E^1E^1, E^1E^2, E^1E^3, E^1E^4$	Apricot, Honey, White
2 Apricot	$E^2E^2, E^2E^3, E^2E^4$	Honey, White
3 Honey	$E^3E^3, E^3E^4$	White
4 White	$E^4E^4$	

$E^1E^4$  (red eye color) x  $E^2E^3$  (apricot eye color)

	$E^2$	$E^3$
$E^1$	$E^1E^2$	$E^1E^3$
$E^4$	$E^2E^4$	$E^3E^4$

Multiple alleles control the intensity of pigment in mice. The  $D^1$  designates full colour,  $D^2$  designates dilute colour, and  $D^3$  is deadly when homozygous. When a full colour male is mated to a dilute colour female the offspring are produced in the following ratio: 2 full colour to 1 dilute to 1 dead. Determine the genotypes of the parents.

full -  $D^1D^1$ ,  $D^1D^2$ ,  $D^1D^3$   
 dilute -  $D^2D^2$ ,  $D^2D^3$   
 dead -  $D^3D^3$

	$D^2$	$D^3$
$D^1$	$D^1D^2$	$D^1D^3$
$D^3$	$D^2D^3$	$D^3D^3$

Blood types involve multiple alleles and co dominance

ex type A -  $I^A I^A$  or  $I^A i$  or  $I^A I^O$

type B -  $I^B I^B$  or  $I^B i$  or  $I^B I^O$

type AB -  $I^A I^B$

type O -  $ii$  or  $I^O I^O$

What possible blood types would result from a cross between a heterozygous type A person and someone with type AB

$$I^A I^O \times I^A I^B$$

	$I^A$	$I^B$
$I^A$	$I^A I^A$	$I^A I^B$
$I^O$	$I^A I^O$	$I^B I^O$

dark grey -  $C C$ ,  $C^h C^h$ ,  $C C^h$

chilla -  $C^h C^h$ ,  $C^h C^h$ ,  $C^h C^h$

himalayan -  $C^h C^h$ ,  $C^h C$

white -  $cc$

	1	2
3	4	